

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In the Application of:	)	
Jean-Pierre VAUBOURG, et al.	)	Examiner: Shaun R. Hurley
	)	
on     METHOD AND DEVICE FOR	)	Group Art Unit: 3765
MANUFACTURING A WIRE CORD	)	Confirmation No. 7199
	)	
Serial No.:    10/576,700	)	(Docket No. 6225-0001WOUS)
	)	
Filed:           April 20, 2006	)	

**AMENDMENT AND RESPONSE TO OFFICE ACTION**

Dear Sir:

In response to the Office Action dated November 20, 2007, the time for response extending to February 20, 2008, the Applicant respectfully requests reconsideration of the existing rejections in view of the amendments and remarks presented below.

**AMENDMENTS TO THE SPECIFICATION** begin on page 2;

**AMENDMENTS TO THE CLAIMS** begin on page 4;

**REMARKS** begin on page 8.

### **Amendments to the Specification:**

Please replace paragraph [0013] with the following:

[0013] Within a toothed surface, two successive teeth with a tooth thickness  $t$  are separated by a gap with a gap width  $g$ , wherein the tooth thickness  $t$  and the gap width  $g$  shall preferably satisfy following relation:  $2t < g < 4t$ . Furthermore, if the wires have a diameter  $D$ , the tooth thickness  $t$  and the diameter  $D$  should satisfy following relation:  $2D < t < 4D$ , wherein the wires normally have a diameter  $D$  between  $[[0,2]]$  0.2 mm and  $[[1,0]]$  1.0 mm and most often between  $[[0,2]]$  0.2 mm and  $[[0,5]]$  0.5 mm.

Please replace paragraph [0026] with the following:

[0026] The crimping device 32 will now be described with reference to FIG. 2. It comprises a pair of crimping wheels 51, 51' with meshing toothed surfaces 52, 52'. The crimping wheels 51, 51' are auto-rotating when the wires 26.sub.i are pulled through between the meshing toothed surfaces 52, 52'. These toothed surfaces 52, 52' have a particular design. Indeed, two successive teeth with a tooth thickness  $t$  are separated by a gap with a gap width  $g$  that is much larger than the tooth thickness  $t$ . The gap width  $g$  shall normally satisfy the following condition:  $2t < g < 4t$ . The tooth thickness shall be fixed in function of the wire diameter  $D$  and shall normally satisfy following condition:  $2D < t < 4D$ . For a wire diameter  $D$  of  $[[0,38]]$  0.38 mm a tooth thickness  $t$  of 1 mm and a gap width  $g$  of 3 mm were retained. The teeth shall have a rounded profile in order not to damage the wires. The distance between the two crimping wheels 51, 51' shall be finely adjustable, so that the penetration of the teeth of one wheel into the gaps of the other wheel can be adjusted. This can e.g. be achieved by mounting one of the crimping wheels 51, 51' on a conventional micrometer adjustment device (not shown).

Please replace paragraph [0030] with the following:

[0030] It will be appreciated that locating the crimping of the wires at the beginning of the twisting together of the wires, allows to obtain excellent results with regard to the elongation at rupture of the cord and the elastomer penetration into the cord. Thus it has e.g. been possible to make a  $5 \times [[0,38]]$  0.38 HT HE steel cord with an elongation at rupture of more than 5%. There is no smoothing of the crimped wires before they are

twisted together and there is a very homogeneous distribution of the crimping waves in the twisted cord. Furthermore, the method in accordance with the present invention can be carried out with very simple crimping equipment, it does not need complicated adjustments and allows to obtain very good productivity results.

### Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

#### Listing of Claims:

1. - 13. (Canceled)

14. (Previously presented) A method for manufacturing a wire cord, said method comprising the steps of:  
bundling a plurality of wires in a bundling means in such a way to form a bundle of wires wherein said wires lie closely side-by-side in one plane;  
crimping said wires by passing said bundle of wires between meshing toothed surfaces; and  
twisting together said plurality of crimped wires along a twisting path, wherein said meshing toothed surfaces are located at the beginning of said twisting path.

15. (Currently Amended) ~~The method according to claim 14,~~  
A method for manufacturing a wire cord, said method comprising the steps of:  
bundling a plurality of wires in a bundling means in such a way to form a bundle of wires wherein said wires lie closely side-by-side in one plane;  
crimping said wires by passing said bundle of wires between meshing toothed surfaces; and  
twisting together said plurality of crimped wires along a twisting path, wherein said twisting together starts between said meshing toothed surfaces.

16. (Previously presented) The method according to claim 15, wherein:  
at the entrance of said meshing toothed surfaces, said wires still lie closely side-by-side in one plane; and  
at the outlet of said meshing toothed surfaces, said wires are crossing one another.

17. (Currently amended) A machine for manufacturing a wire cord, said machine comprising:
- a bundling means for bundling a plurality of wires, wherein said bundling means is configured in such a way as to force said plurality of wires to form a bundle of wires wherein said wires lie closely side-by-side in one plane;
  - a crimping means located downstream of said bundling means, said crimping means comprising crimping wheels with meshing toothed surfaces for crimping said wires; and
  - a twisting means for twisting together said wires along a twisting path, wherein said crimping means is located at the beginning of said twisting path.
18. (Previously presented) The machine according to claim 17, wherein said bundling means is located between 30 mm to 60 mm from the point where said bundle of wires enters between said meshing toothed surfaces.
19. (Previously presented) The machine according to claim 17, wherein said bundling means is a bundling die with an aperture, said aperture being dimensioned in such a way as to force said plurality of wires to lie closely side-by-side in one plane.
20. (Previously presented) The machine according to claim 19, wherein said bundling die is located between 30 mm to 60 mm from the point where said bundle of wires enters between said meshing toothed surfaces.
21. (Previously presented) The machine according to claim 17, wherein in said meshing toothed surfaces two successive teeth with a tooth thickness  $t$  are separated by a gap with a gap width  $g$ , and said tooth thickness  $t$  and said gap width  $g$  satisfy following relation:  $2t < g < 4t$ .
22. (Previously presented) The machine according to claim 21, wherein said wires have a diameter  $D$  and said tooth thickness  $t$  and said diameter  $D$  satisfy following relation:  
 $2D < t < 4D$ .

23. (Currently amended) The machine according to claim 22, wherein said wires have a diameter D between  $[[0,2]]$  0.2 and  $[[1,0]]$  0.1 mm.
24. (Currently amended) The machine according to claim 17, wherein said crimping means comprises a pair of crimping wheels with meshing toothed surfaces for crimping said wires, the distance between said crimping wheels in said pair  $[[is]]$  being finely adjustable, so that the penetration of the teeth of one wheel into the gaps of the other wheel is adjustable.
25. (Previously presented) The machine according to claim 17, wherein said twisting means comprises:  
a rotor that can be rotated about a rotor rotation axis; and  
a deflection pulley supported on said rotor, said deflection pulley forming the end of said twisting path, wherein the latter is substantially co-axial to said rotor rotation axis.
26. (Currently amended) A machine for manufacturing a wire cord, said machine comprising: ~~The machine according to claim 17, further comprising:~~  
a support structure;  
a rotor with a first rotor end and a second rotor end, said rotor being supported by said support structure in such a way as to be capable of rotating about a rotor rotation axis;  
a cradle supported between said first rotor end and said second rotor end, in such a way as to be capable of freely rocking about said rotor rotation axis, whereby said cradle remains immobile in rotation when said rotor is rotated;  
a plurality of wire unwinding devices supported by said cradle;  
guiding means mounted on said cradle for guiding a plurality of wires from said unwinding devices towards said ~~pair of crimping wheels, said pair of crimping wheels being mounted on said cradle in such a way as to be substantially aligned with said~~ rotor rotation axis;  
a bundling means mounted on said cradle for bundling said plurality of wires

from said unwinding devices, wherein said bundling means is configured in such a way as to force said plurality of wires to form a bundle of wires wherein said wires lie closely side-by-side in one plane substantially within said rotor rotation axis;

a crimping means mounted on said cradle downstream of said bundling means, said crimping means comprising crimping wheels with meshing toothed surfaces for crimping said wires substantially within said rotor rotational axis;

a twisting means for twisting together said wires along a twisting path, wherein said crimping means is located at the beginning of said twisting path, said twisting means comprising a first deflection pulley supported on said first end of said rotor, in such a way as to be capable of twisting together said plurality of wires in said twisting path, which extends from said first deflection pulley to said pair of crimping wheels;

first flyer arm connected to said first rotor end and a second flyer arm connected to said second rotor end, said first and second flyer arm being capable of guiding the twisted wires about said cradle from said first rotor end to said second rotor end;

a second deflection pulley supported on said second end of said rotor, in such a way as to be capable of guiding said twisted wires coming from said second flyer arm axially out of said second rotor end; and

a pulling means for pulling said twisted wires out of said second rotor end.

## **REMARKS**

As an initial matter, the Applicant thanks the Examiner for his thorough review of the present application. Currently, claims 14-26 are pending. In the outstanding Office Action, the Examiner has objected to the specification and claims as containing several informalities. The Examiner has also rejected claims 14, 17, 18, 19 and 20 - 25 as being either anticipated or obviated by Watakabe (U.S. Pat. No. 5,111,649). Finally, the Examiner has indicated that claim 26 is allowable if rewritten in independent form to include the limitations of any base and intervening claims. The Applicant believes that it has addressed all objections and rejections through the amendments and arguments presented below.

### ***Amendments to the Specification***

The Examiner has objected to the disclosure as numerical ranges are punctuated with commas instead of periods. The Applicant has amended the specification to correct all instances of improper numerical punctuation. In particular, paragraphs [0013], [0026] and [0030] have been amended. Amendments were for clarification purposes only and no new matter was entered.

### ***Amendments to the Claims***

The Applicant has amended claim 26 to be independent and include limitations of base and intervening claims. The Applicant has also amended claim 24 to clarify the “crimping means” and claims 17 and 23 to correct several informalities. Finally, the Applicant amended claim 15 to create an independent claim incorporating several limitations of claim 14. Applicant’s amendments clarify the invention as claimed and do not involve the addition of any new matter.

### ***Claim Rejections – 35 USC §102***

The Examiner has rejected claims 14, 17, 19 and 24 under §102(b) as being anticipated by Watakabe. Watakabe does not, however, teach or suggest each and every limitation of the rejected claims as discussed below.



According to the MPEP, for anticipation under §102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. See MPEP §706.02. Any feature not directly taught must be inherently present. *Id.* Here, Watakabe does not teach every aspect of the amended claims.

Watakabe is directed to a method of manufacturing a tire steel cord formed of more than three strands twisted together. At least one of the strands being marked so as to be formed with zig-zagging marked parts which form gaps between strands. Rubber is then placed within the gaps so as to fill in a cavity in a center part of the cord.

Watakabe does not disclose or suggest, however, meshing toothed surfaces or crimping wheels located at the *beginning* of a twisting path as recited in claim 14. Watakabe teaches passing the crimped wires through through-holes in a stationary “batten plate 8” that is located between the marking elements 7 with their meshed tooth surfaces 7a and a twisting machine 9. Significantly, in this “batten plate 8,” the crimped wires are *spaced apart and separated* from one another before being introduced into the twisting machine 9, in which they are twisted together to form a steel cord, (see Fig 4, col. 3; lines 27-36 and 45-48, and col. 4 lines 1 to 4). In view of the above, Watakabe teaches that it is desirable to *prevent* a twisting of the wires at a certain distance downstream of the meshed tooth surfaces 7a by isolating them with a batten plate 8. Therefore, Watakabe teaches away from the present method where the crimping means, e.g., meshing toothed surfaces, at located at the beginning of the twisting path.

As discussed in the specification of the present application, the apparatus and method of Watakabe has major drawbacks. Indeed, the tooth surfaces 7a can provide only a relatively flat deformation of the wires without risking damage to them. Moreover, the batten plate 8 smooths the crimped wires prior to twisting which is undesirable.

In contrast, the meshing toothed surfaces of the crimping device 32 are located at the *beginning* of a twisting path. It will be appreciated that locating the crimping of the wires at the beginning of the twisting together of the wires, allows one to obtain excellent results with regard to the elongation at rupture of the cord and the elastomer

penetration into the cord. *See* Application at [0030]. Thus it has been possible to make a 5 x 0.38 steel cord with an elongation at rupture of more than 5%. *Id.* Significantly, there is no smoothing of the crimped wires before they are twisted together and there is a very homogeneous distribution of the crimping waves in the twisted cord. *Id.* Furthermore, the method in accordance with the present invention can be carried out with very simple crimping equipment, it does not need complicated adjustments and allows to obtain very good productivity results. *Id.*

Furthermore, Watakabe is completely silent on how the wires are bundled by guide roller 6. As such, Watakabe does not teach bundling a plurality of wires in such a way to form a bundle of wires wherein said wires *lie closely side-by-side in one plane* as recited in claim 14. As discussed in the application, this configuration has been shown to yield excellent results. Again, Watakabe does not teach or suggest all limitations of claim 14 and, therefore, cannot form the proper basis for a §102 rejection.

Claim 17 contains the above-discussed limitations and is also not anticipated by Watakabe. Claims 18 – 25 all depend from claim 17 and are also allowable as discussed above. Claim 15 has been amended to include the limitations of claim 14 and, as such, claims 15 and 16 are allowable as discussed above.

### ***Claim Rejections – 35 USC §103***

The Examiner has also rejected claims 18, 20-23 and 25 as being unpatentable in view of Watakabe. The Applicant believes it has traversed the Examiner's §103 rejection through the arguments presented below and requests reconsideration.

To establish a *prima facie* case of obviousness of a claimed invention, each and every claim limitation must be taught or suggested by the prior art. *See* MPEP 2143.03. With respect to the rejected claims, Watakabe fails to teach or suggest numerous limitations.

Claims 18, 20-23 and 25 all depend from claim 17. As discussed above, Watakabe does not disclose, teach or suggest multiple limitations of claim 17 and, accordingly, claims 18, 20-23 and 25 that depend therefrom.

Additionally, the scant specification of Watakabe is devoid of any teaching or suggestion of the ability to finely adjust the distance between the meshed tooth surfaces 7a. Consequently, one of ordinary skill in the art will inevitably conclude that the distance between the tooth surfaces 7a is fixed. This is significant in that the rejected claims are directed in part to varying distances between the bundling means. In no way does Watakabe teach or suggest such an apparatus or method and rejection of the claims under §103 is believed improper.

***Allowable Subject Matter***

The Examiner has indicated that claim 26 is allowable if rewritten in independent form with all limitations of the base claim and intervening claims. The Applicant has amended the claim accordingly and believes it to be allowable. Additionally, the Applicant notes that the Examiner has not rejected claims 15 and 16. As such, the Applicant requests that they be passed to allowance.

No fees are considered to be due; however, if it is determined that payment of a fee is required, please charge our deposit account No. 13-0235.

Respectfully submitted,

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